

**IN THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application.

**Listing of Claims:**

**Claims 1-30 (Canceled)**

**Claim 31 (New):** A method for detecting a cancer, comprising the steps of:

- (i) measuring an amount of total carcinoembryonic antigens and an amount of carcinoembryonic antigens having a specific modified sugar chain structure or an amount of carcinoembryonic antigens having a sugar chain structure other than the specific one by using an antibody against a constant region of carcinoembryonic antigens and a protein capable of recognizing a specific modified sugar chain structure of carcinoembryonic antigens,
- (ii) calculating a ratio of the amount of carcinoembryonic antigens having the specific modified sugar chain structure or carcinoembryonic antigens having the sugar chain structure other than the specific one relative to the amount of total carcinoembryonic antigens, and
- (iii) detecting a cancer using the ratio as an indicator for the detection.

**Claim 32 (New):** A method for detecting a cancer, comprising the steps of:

- (i) measuring an amount of carcinoembryonic antigens having a specific modified sugar chain structure and an amount of carcinoembryonic antigens having a sugar chain structure other than the specific one by using an antibody against a constant region of carcinoembryonic antigens and/or a protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens, and
- (ii) detecting a cancer using two amounts selected from the group consisting of: the amount of carcinoembryonic antigens having the specific modified sugar chain structure, the amount of carcinoembryonic antigens having the sugar chain structure other than the specific one and a total amount of carcinoembryonic antigens having the specific modified sugar chain structure and carcinoembryonic antigens having the sugar chain structure other than the specific one as an indicator for the detection.

**Claim 33 (New):** The method according to Claim 32, wherein step (ii) comprises:

calculating a ratio of the amount of carcinoembryonic antigens having the specific modified sugar chain structure relative to the amount of carcinoembryonic antigens having the sugar chain structure other than the specific one, and

detecting a cancer using the ratio as an indicator for the detection.

**Claim 34 (New):** The method according to Claim 32, wherein step (ii) comprises:

calculating a ratio of the amount of carcinoembryonic antigens having the specific modified sugar chain structure or the amount of carcinoembryonic antigens having the sugar chain structure other than the specific one relative to a total amount of carcinoembryonic antigens having the specific modified sugar chain structure and carcinoembryonic antigens having the sugar chain structure other than the specific one, and

detecting a cancer using the ratio as an indicator for the detection.

**Claim 35 (New):** The method according to Claim 32, wherein step (i) comprises:

reacting a sample containing carcinoembryonic antigens with an antibody against a constant region of carcinoembryonic antigens and a protein capable of recognizing a specific modified sugar chain structure of carcinoembryonic antigens to give a complex I of carcinoembryonic antigens and the antibody and a complex II of carcinoembryonic antigens, the antibody and the protein, and

measuring each independently, an amount of the complex I and an amount of the complex II; and

wherein step (ii) comprises:

calculating a ratio of the amount of the complex I or the amount of the complex II relative to a total amount of the complex I and complex II, and

detecting a cancer using the ratio as an indicator for the detection.

**Claim 36 (New):** The method according to Claim 32, wherein step (i) comprises:

reacting a sample containing carcinoembryonic antigens with (1) an antibody (antibody 1)

against a constant region of carcinoembryonic antigens having a property of binding to the constant region of carcinoembryonic antigens but incapable of binding to carcinoembryonic antigens having a specific modified sugar chain structure to which a protein capable of binding to the specific modified sugar chain structure is already bound, (2) an antibody (antibody 2) against a constant region of carcinoembryonic antigens having a property of binding to all carcinoembryonic antigens no matter whether the protein capable of binding the specific modified sugar chain is already bound or not and (3) the protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens to give (a) a complex I of carcinoembryonic antigens, the antibody 1 capable of binding to a modified sugar chain structure that is already bound and the antibody 2 and (b) a complex II of carcinoembryonic antigens, the antibody 2 and the protein, and measuring each independently, an amount of the complex I and an amount of the complex II; and

wherein step (ii) comprises:

calculating a ratio of the amount of the complex I or the amount of the complex II relative to a total amount of the complex I and complex II, and

detecting a cancer using the ratio as an indicator for the detection.

**Claim 37 (New):** The method according to Claim 32, wherein step (i) comprises:

reacting a sample containing carcinoembryonic antigens with an antibody (antibody 3) against a constant region of carcinoembryonic antigens and after the reaction, further reacting the thus obtained reaction solution with a protein capable of recognizing a modified sugar chain structure of carcinoembryonic antigens and an antibody (antibody 1) against a constant region of

carcinoembryonic antigens having a property of binding to the constant region of carcinoembryonic antigens but incapable of binding to carcinoembryonic antigens having the specific modified sugar chain structure to which a protein capable of binding to the specific modified sugar chain structure is already bound to give (a) a complex I of carcinoembryonic antigens, the antibody 3 and the antibody 1 and (b) a complex II of carcinoembryonic antigens, the antibody 3 and the protein, and measuring each independently, an amount of the complex I and an amount of the complex II; and wherein step (ii) comprises:

calculating a ratio of the amount of the complex I or the amount of the complex II relative to a total amount of the complex I and complex II, and

detecting a cancer using the ratio as an indicator for the detection.

**Claim 38 (New):** The method according to Claim 32, wherein step (i) comprises:

(1) measuring an amount of carcinoembryonic antigens having a specific modified sugar chain structure by a process selected from the following group of processes (a), (b) and (c):

(a) reacting a sample containing carcinoembryonic antigens with an antibody (antibody 3) against a constant region of carcinoembryonic antigens to give a complex of carcinoembryonic antigens and the antibody and further reacting the complex with a protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens to give a complex II of carcinoembryonic antigens, the antibody 3 and the protein and,

measuring an amount of the complex II,

(b) reacting a sample containing carcinoembryonic antigens with a protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens to give a complex of carcinoembryonic antigens and the protein and further reacting the complex with an antibody (antibody 3) against a constant region of carcinoembryonic antigens to give a complex II of carcinoembryonic antigens, the protein the antibody 3 and, measuring an amount of the complex II, and

(c) reacting a sample containing carcinoembryonic antigens with a protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens and an antibody (antibody 2) against a constant region of carcinoembryonic antigens having a property of binding to all carcinoembryonic antigens no matter whether the protein is already bound or not to give a complex II of carcinoembryonic antigens, the antibody 2 and the protein and,

measuring an amount of the complex II;

(2) measuring an amount of carcinoembryonic antigens having a sugar chain structure other than the specific one by a process selected from the following group of processes (d), (e), (f) and (g):

(d) reacting a sample containing carcinoembryonic antigens with a protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens to give carcinoembryonic antigens having no protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens bound thereto and a complex II of carcinoembryonic antigens and the protein and,

measuring an amount of the carcinoembryonic antigens having no protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens bound thereto,

(e) reacting a sample containing carcinoembryonic antigens with an antibody (antibody 3) against a constant region of carcinoembryonic antigens to give a complex of carcinoembryonic antigens and the antibody 3,

reacting the complex with a protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens and after the reaction, further reacting with an antibody (antibody 1) against a constant region of carcinoembryonic antigens having a property of binding to the constant region of carcinoembryonic antigens but incapable of binding to carcinoembryonic antigens having the specific modified sugar chain structure to which the protein is already bound to give a complex II of carcinoembryonic antigens, the antibody 3 and the protein and a complex I of carcinoembryonic antigens, the antibody 3 and the antibody 1 and,

measuring an amount of the complex I,

(f) reacting a sample containing carcinoembryonic antigens with a protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens to give a complex of carcinoembryonic antigens and the protein,

reacting thus sample with an antibody (antibody 1) against a constant region of carcinoembryonic antigens having a property of binding to the constant region of carcinoembryonic antigens but incapable of binding to carcinoembryonic antigens having the

specific modified sugar chain structure to which the protein is already bound to give a complex of the carcinoembryonic antigens having no protein capable of recognizing a modified sugar chain structure of carcinoembryonic antigens bound thereto and the antibody 1,

reacting the complex with an antibody (antibody 3) against a constant region of carcinoembryonic antigens to give a complex I of the carcinoembryonic antigens having no protein capable of recognizing a modified sugar chain structure of carcinoembryonic antigens bound thereto, the antibody 1 and the antibody 3,

measuring an amount of the complex I, and

(g) reacting a sample containing carcinoembryonic antigens with a protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens to give a complex of carcinoembryonic antigens and the protein,

reacting thus sample with an antibody (antibody 1) against a constant region of carcinoembryonic antigens having a property of binding to the constant region of carcinoembryonic antigens but incapable of binding to carcinoembryonic antigens having the specific modified sugar chain structure to which the protein is already bound to give a complex I of the carcinoembryonic antigens having no protein capable of recognizing a modified sugar chain structure of carcinoembryonic antigens bound thereto and the antibody 1 and,

measuring an amount of the complex I; and

wherein step (ii) comprises:

calculating a ratio of the amount of carcinoembryonic antigens having the specific modified



sugar chain structure obtained by (1) or carcinoembryonic antigens having the sugar chain structure other than the specific one obtained by (2) relative to a total amount of carcinoembryonic antigens having the specific modified sugar chain structure obtained by (1) and carcinoembryonic antigens having the sugar chain structure other than the specific one obtained by (2) , and

detecting a cancer using the ratio as an indicator for the detection.

**Claim 39 (New):** The method according to Claim 31, wherein step (i) comprises:

(1) measuring an amount of total carcinoembryonic antigens in a sample containing carcinoembryonic antigens by using an antibody against a constant region of carcinoembryonic antigens, and

(2) (2-1) measuring an amount of carcinoembryonic antigens having a specific modified sugar chain structure by a process selected from the following group of processes

(a), (b) and (c):

(a) reacting a sample containing carcinoembryonic antigens with an antibody (antibody 3) against a constant region of carcinoembryonic antigens to give a complex of carcinoembryonic antigens and the antibody and further reacting the complex with a protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens to give a complex II of carcinoembryonic antigens, the antibody 3 and the protein and,

measuring an amount of the complex II,

(b) reacting a sample containing carcinoembryonic antigens with a protein

capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens to give a complex of carcinoembryonic antigens and the protein and further reacting the complex with an antibody (antibody 3) against a constant region of carcinoembryonic antigens to give a complex II of carcinoembryonic antigens, the protein, the antibody 3 and,

measuring an amount of the complex II, and

(c) reacting a sample containing carcinoembryonic antigens with a protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens and an antibody (antibody 2) against a constant region of carcinoembryonic antigens having a property of binding to all carcinoembryonic antigens no matter whether the protein is already bound or not to give a complex II of carcinoembryonic antigens, the antibody 2 and the protein and,

measuring an amount of the complex II;

(2-2) measuring an amount of carcinoembryonic antigens having a sugar chain structure other than the specific one by a process selected from the following group of processes (d), (e), (f) and (g):

(d) reacting a sample containing carcinoembryonic antigens with a protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens to give carcinoembryonic antigens having no protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens bound thereto and a complex II of carcinoembryonic

antigens and the protein and,

measuring an amount of the carcinoembryonic antigens having no protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens bound thereto,

(e) reacting a sample containing carcinoembryonic antigens with an antibody (antibody 3) against a constant region of carcinoembryonic antigens to give a complex of carcinoembryonic antigens and the antibody 3,

reacting the complex with a protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens and after the reaction, further reacting with an antibody (antibody 1) against a constant region of carcinoembryonic antigens having a property of binding to the constant region of carcinoembryonic antigens but incapable of binding to carcinoembryonic antigens having the specific modified sugar chain structure to which the protein is already bound to give a complex II of carcinoembryonic antigens, the antibody 3 and the protein and a complex I of carcinoembryonic antigens, the antibody 3 and the antibody 1 and,

measuring an amount of the complex I,

(f) reacting a sample containing carcinoembryonic antigens with a protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens to give a complex of carcinoembryonic antigens and the protein,

reacting thus sample with an antibody (antibody 1) against a constant

region of carcinoembryonic antigens having a property of binding to the constant region of carcinoembryonic antigens but incapable of binding to carcinoembryonic antigens having the specific modified sugar chain structure to which the protein is already bound to give a complex of the carcinoembryonic antigens having no protein capable of recognizing a modified sugar chain structure of carcinoembryonic antigens bound thereto and the antibody 1,

reacting the complex with an antibody (antibody 3) against a constant region of carcinoembryonic antigens to give a complex I of the carcinoembryonic antigens having no protein capable of recognizing a modified sugar chain structure of carcinoembryonic antigens bound thereto, the antibody 1 and the antibody 3,

measuring an amount of the complex I, and

(g) reacting a sample containing carcinoembryonic antigens with a protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens to give a complex of carcinoembryonic antigens and the protein,

reacting thus sample with an antibody (antibody 1) against a constant region of carcinoembryonic antigens having a property of binding to the constant region of carcinoembryonic antigens but incapable of binding to carcinoembryonic antigens having the specific modified sugar chain structure to which the protein is already bound to give a complex I of the carcinoembryonic antigens having no protein capable of recognizing a modified sugar chain structure of carcinoembryonic antigens bound thereto and the antibody 1 and,

measuring an amount of the complex I; and

wherein step (ii) comprises:

calculating a ratio of the amount of carcinoembryonic antigens having the specific modified sugar chain structure obtained by (2-1) or carcinoembryonic antigens having the sugar chain structure other than the specific one obtained by (2-2) relative to the amount of total carcinoembryonic antigens obtained by (1).

**Claim 40 (New):** The method according to Claim 31, wherein the protein is an antibody or a lectin.

**Claim 41 (New):** The method according to Claim 40, wherein the antibody is one recognizing a sugar chain containing fucose residue and/or a sialic acid residue.

**Claim 42 (New):** The method according to Claim 42, wherein the antibody is an anti-Lewis type sugar chain antibody or an anti-sialyl Lewis type sugar chain antibody.

**Claim 43 (New):** The method according to Claim 42, wherein the anti-Lewis type sugar chain antibody is an anti-Le<sup>a</sup> antibody, an anti-Le<sup>b</sup> antibody, an anti-Le<sup>x</sup> antibody or an anti-Le<sup>y</sup> antibody.

**Claim 44 (New):** The method according to Claim 42, wherein the anti-sialyl Lewis type sugar chain antibody is an anti-S-Le<sup>a</sup> antibody or an anti-S-Le<sup>x</sup> antibody.

**Claim 45 (New):** The method according to Claim 40, wherein the lectin is an L-fucose binding lectin, a D-galactose or an N-acetyl-D-galactosamine binding lectin, a D-mannose binding lectin, an N-acetylglucosamine binding lectin or a sialic acid binding lectin.

**Claim 46 (New):** The method according to Claim 40, wherein the lectin is Concanavalin A, *Ricinus communis* agglutinin, *Lens culinaris* agglutinin or Phytohemagglutinin.

**Claim 47 (New):** A kit for detecting a cancer, comprising (i) an antibody against a constant region of carcinoembryonic antigens and (ii) the protein capable of recognizing the specific modified sugar chain structure of carcinoembryonic antigens.

**Claim 48 (New):** The kit according to Claim 47, wherein the antibody comprises (1) an antibody against a constant region of carcinoembryonic antigens having a property of binding to the constant region of carcinoembryonic antigens but incapable of binding to carcinoembryonic antigens having a specific modified sugar chain structure to which a protein capable of binding to the specific modified sugar chain structure is already bound, and (2) an antibody against a constant region of carcinoembryonic antigens having a property of binding to all carcinoembryonic antigens no matter

whether the protein capable of binding the specific modified sugar chain is already bound or not.

**Claim 49 (New):** The kit according to Claim 47, further comprising (iii) an antibody against a constant region of carcinoembryonic antigens having a property of binding to the constant region of carcinoembryonic antigens but incapable of binding to carcinoembryonic antigens having a specific modified sugar chain structure to which a protein capable of binding to the specific modified sugar chain structure is already bound.

**Claim 50 (New):** The kit according to Claim 47, wherein the protein is an antibody or a lectin.

**Claim 51 (New):** The kit according to Claim 50, wherein the antibody is one recognizing a sugar chain containing a fucose residue and/or a sialic acid residue.

**Claim 52 (New):** The kit according to Claim 50, wherein the antibody is an anti-Lewis type sugar chain antibody or an anti-sialyl Lewis type sugar chain antibody.

**Claim 53 (New):** The kit according to Claim 52, wherein the anti-Lewis type sugar chain antibody is an anti-Le<sup>a</sup> antibody, an anti-Le<sup>b</sup> antibody, an anti-Le<sup>x</sup> antibody or an anti-Le<sup>y</sup> antibody.

**Claim 54 (New):** The kit according to Claim 52, wherein the anti-sialyl Lewis type sugar chain antibody is an anti-S-Le<sup>a</sup> antibody or an anti-S-Le<sup>x</sup> antibody.

**Claim 55 (New):** The kit according to Claim 50, wherein the lectin is an L-fucose binding lectin, a D-galactose or an N-acetyl-D-galactosamine binding lectin, a D-mannose binding lectin, an N-acetylglucosamine binding lectin or a sialic acid binding lectin.

**Claim 56 (New):** The kit according to Claim 50, wherein the lectin is Concanavalin A, *Ricinus communis* agglutinin, *Lens culinaris* agglutinin or Phytohemagglutinin,